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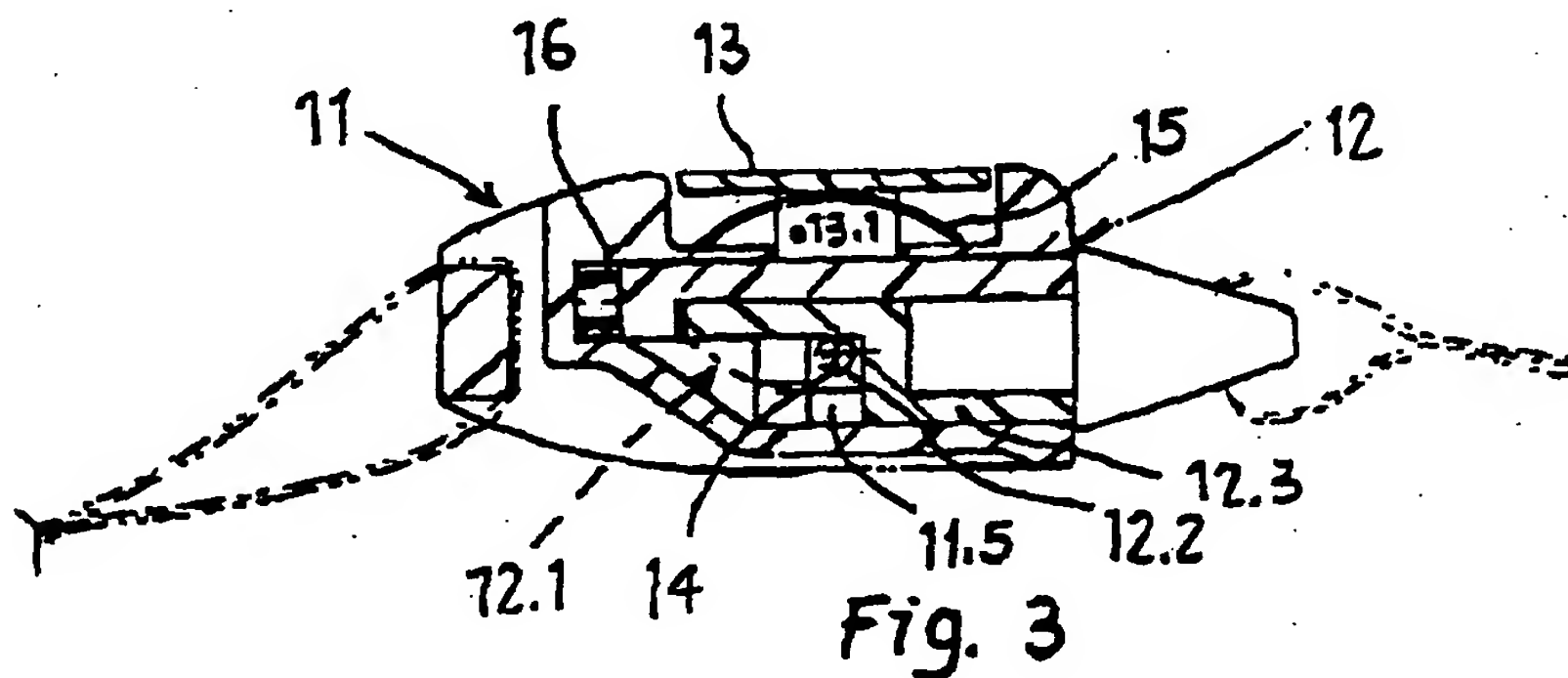
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(54) **Buckle for three-strap seat belt for safety seats for children transported in motor vehicles and the like**

(57) The buckle includes a shell, attached to one of the belt straps, a pair of plastic tongues, each attached to one of the other two belt straps and inserted, for fastening purposes, into the shell on top of each other, retention means which, when acted upon by elastic means, engage with the tongues when the latter are pushed into the shell, holding them firmly, and a release button able to move between a rest position and a working position, into which it is pushed manually, against the action of the elastic means, and disengages the retention means from the tongues, while an elastic ejection member, which is preloaded by the insertion of the

tongues, automatically ejects the latter.

According to the invention the said button (13) is able to move in a guided manner (in 11.3) relative to the said shell (11) and carries an integral metal pawl (14) that engages with the said tongues (12), the latter being inserted into the shell (11) on top of each other, by moving in a plane approximately perpendicular to the direction of insertion of the tongues, and keeps the parts securely engaged by the return action of the said elastic means (15), which push the said release button (13) into its rest position.



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## Description

The present invention relates to a buckle for three-strap seat belt for safety seats for children transported in motor vehicles and the like.

Buckles of the specified type are known and usually comprise a rigid plastic shell that is attached to the free end of one of the seat belt straps (for example, the strap passing between the legs of the child to whom the belt is fitted), as well as a pair of rigid plastic tongues that are each attached to a respective free end of each of the other two belt straps and which, for the purposes of fastening the belt, are inserted into the shell on top of each other through an opening.

Retention means acted upon by elastic means engage automatically with the tongues when the latter are pushed fully home in the shell, holding them firmly against withdrawal (the closed condition of the buckle, in which the seat belt is fastened).

A release button is able to move relative to the shell in order, when pressed manually against the action of the elastic means, to disengage the tongues from the retention means, while an elastic ejection member, which is preloaded by the insertion of the tongues, automatically ejects the tongues from the shell through the opening (the open condition of the buckle, in which the seat belt is unfastened).

In known buckles of the specified kind, both the tongues and the retention members are made of plastic. When coupled together and subjected to stresses, therefore, these members are subject to the inevitable plastic deformations to which plastic components are prone. This often leads to defective retention of the tongues when the buckle is closed, resulting in unintended unfastening of the belt.

Furthermore, in known buckles of the specified kind, the structure and/or the relative arrangement of the retention members and of the release button are comparatively complicated. This reduces the reliability of operation and increases the cost of manufacture of the buckle.

The present invention takes the above drawbacks as its starting point and seeks to remedy them.

The principal object of the present invention is therefore to provide a buckle for a three-strap seat belt for safety seats for children transported in motor vehicles and the like, which will ensure that, when the buckle is closed, the fastening of the belt is strong and secure.

Another object is to provide a buckle for a seat belt as specified, with a simplified structure and giving safe, reliable operation.

In order to achieve these objects, the present invention provides a buckle for a three-strap seat belt for safety seats for children transported in motor vehicles and the like, the essential characteristic of which forms the subject of the main claim.

Other advantageous characteristics are given in the dependent claims.

The abovementioned claims should be understood as incorporated here in their entirety.

The present invention is described below with reference to the accompanying drawings, furnished purely by way of example, in which:

- Fig. 1 is an exploded perspective view of the seat belt buckle in one embodiment of the invention, in which the belt is omitted in order to simplify the drawing;
- Fig. 2 is a longitudinal section through the buckle of Fig. 1, the buckle being open;
- Fig. 3 is a view similar to that of Fig. 2 but with the buckle closed; and
- Fig. 4 is a view similar to Fig. 3, but in which a release button is pressed in order to open the buckle.

With reference to the drawings, the numeral 10 (Fig. 1) is a general reference for the whole buckle for a three-strap seat belt for safety seats for children transported in motor vehicles and the like, in one example of an embodiment of the present invention.

The said buckle 10 comprises a rigid plastic shell 11 that is securely attached to the free end of one of the seat belt straps, for example the strap passing between the legs of the child to whom the belt is fitted.

The said shell 11 has two openings, a front opening 11.1 and a top opening 11.2 (Fig. 1), which communicate with its internal cavity.

12 denotes a pair of rigid plastic tongues, each securely attached to a respective free end of the other two seat belt straps: for the purposes of fastening the said belt, these are inserted into the shell 11, longitudinally and on top of each other, through the front opening 11.1. It will be observed in particular that the forward end of the pair of superimposed tongues 12 (Figs. 2-4), which enters the shell 11 longitudinally through the front opening 11.1, is basically wedge shaped (Fig. 2) with a sliding face 12.1 interrupted by a deep transverse cut 12.2, followed - in the direction of insertion through the opening 11.1 - by a stepped projection 12.3 that engages with play with the said opening 11.1, when the superimposed tongues 12 are pushed fully home into the said shell 11 (Figs. 3, 4).

The shell 11 contains a release button 13 that can be moved through the top opening 11.2 and is guided relative to this shell in a plane approximately perpendicular to the direction of insertion of the superimposed tongues 12 through the front opening 11.1.

The said button 13 comprises a pair of integral straight fingers 13.1 extending like the tines of a fork and guided relative to corresponding guides 11.3 (only one of which is visible in Fig. 1) on the inside of the opposite longitudinal side walls 11.4 of the shell 11.

In the said longitudinal side walls 11.4, each guide 11.3 contains a through slot 11.5 (only one of which is visible in Fig. 1) close to the back 11.6 of the shell 11,

the major axes of which are aligned with each other in the said plane which is approximately perpendicular to the direction of insertion of the superimposed tongues into this shell.

A transverse metal locking pin 14 is fixed in the region of the free ends of the said fingers 13.1 and its ends extend into the said slots 11.5. The said transverse locking pin 14 is thus able to move, together with the release button 13, within the said approximately perpendicular plane.

A leaf spring 15, made e.g. of metal, is fitted in the top opening 11.2, between the said release button 13 and the shell 11, in such a way that the button 13 with the integral pin 14 can be moved relative to the shell 11 by manual pressure (arrow P, Fig. 4) into a working position, in which it is depressed into the opening 11.2 in opposition to the elastic force of the spring 15, which, when the manual pressure is released, pushes the button with its integral pin 14 elastically back into a raised rest position (Figs. 2-3). The said movements of the button 13 relative to the shell 11 are limited by the travel of the ends of the pin 14 in the slots 11.5.

A helical compression spring 16 is fitted inside the shell 11 with its axis approximately parallel to the direction of insertion of the superimposed tongues 12, which compress it elastically, and hence preload it, as the tongues 12 are pushed fully home into the shell. The said spring 16 serves as an automatic means of ejection.

The operation of the buckle 10 is immediately obvious. In order to fasten the seat belt, starting with the buckle 10 open as illustrated in Fig. 2, the tongues 12 are inserted on top of each other into the shell 11, in a longitudinal direction, through the front opening 11.1, in such a way that their sliding face 12.1 passes over the transverse locking pin 14. The wedge action of the superimposed tongues 12 on the pin 14 as the stepped projection 12.3 is guided through the said front opening 11.1 pulls the release button 13 down into the depressed working position, in opposition to the elastic force of the leaf spring 15, until the said pin 14 is level with the transverse cut 12.2, with which the pin then engages with a snap action, in the manner of a pawl, because of the return action of the leaf spring 15 on the button 13.

Further insertion of the superimposed tongues 12 into the shell 11 is prevented by the locking pin 14, which now bears against the said stepped projection 12.3.

The said locking pin 14 thus holds the superimposed tongues 12 securely so that they cannot come out of the shell 11 (Fig. 3), while the release button 13, integral with this pin 14, is automatically returned to and held in its raised rest position by the elastic force of the leaf spring 15.

The seat belt is securely fastened.

In order to unfasten the seat belt it is sufficient to apply manual pressure P on the release button 13 to

overcome the elastic force of the leaf spring 15 and sink the button into the opening 11.2 as far as its depressed working position (Fig. 4).

In this position of the release button 13, the transverse locking pin 14 releases the transverse cut 12.2 of the superimposed tongues 12, on which the ejector spring 16, which was preloaded during the insertion of the tongues into the shell 11, acts with an opposing elastic force. The said ejector 16 thus automatically expels the superimposed tongues 12 from the shell 11 through the front opening 11.1, so unfastening the seat belt.

When manual pressure is removed, the button 13 with its integral transverse locking pin 14 is automatically pushed back and held by the leaf spring 15 in its raised rest position in the top opening 11.2.

As is clear from the foregoing, the means by which the buckle 10 is kept closed is the metal pawl 14, which engages transversely with the tongues 12, moving in the said plane approximately perpendicular to the direction of insertion of the tongues into the shell 11, and maintains the engaged position owing to the elastic return action exerted by the springs 15, which drive the release button 13 into its rest position. By contrast, the buckle 10 is easily opened by pushing the said release button 13, together with its pawl 14, down the said approximately perpendicular plane against the action of the elastic return means 15 until it reaches the working position.

## Claims

1. Buckle for three-strap seat belt for safety seats for children transported in motor vehicles and the like, including:
  - a rigid shell that is attached to the free end of one of the seat belt straps (for example, the strap passing between the legs of the child to whom the belt is fitted),
  - a pair of rigid plastic tongues that are each attached to a respective free end of each of the other two belt straps and which, for the purposes of fastening the belt, are inserted into the shell on top of each other through an insertion opening,
  - retention means which, acted upon by elastic means, engage automatically with the tongues when the latter are pushed fully home in the shell, holding them firmly against withdrawal (the closed condition of the buckle, in which the seat belt is fastened),
  - a release button, able to move within another opening in the shell between a rest position and a working position, into which the button is pushed manually, against the action of the elastic means, and disengages the retention means from the tongues, while an elastic ejection

tion member, which is preloaded by the insertion of the tongues, automatically ejects the tongues from the shell through the insertion opening (the open condition of the buckle, in which the seat belt is unfastened),

characterized in that the said button (13) is able to move in a guided manner (in 11.3) relative to the said shell (11) and carries an integral metal pawl (14) that engages with the said tongues (12), the latter being inserted into the shell (11) on top of each other through the said insertion opening (11.1), by moving in a plane approximately perpendicular to the direction of insertion of the tongues, and keeps the parts securely engaged by the return action of the said elastic means (15), which push the said release button (13) into its rest position.

2. Buckle for seat belt according to Claim 1, characterized in that the forward end of the said superimposed tongues (12), which enters the shell (11) longitudinally through the said insertion opening (11.1), is basically wedge shaped, with a sliding face (12.1) interrupted by a transverse cut (12.2), followed - in the direction of insertion through the opening (11.1) - by a projection (12.3) that engages with play with the said opening (11.1), when the superimposed tongues (12) are pushed fully home into the said shell (11), in that the said button (13) comprises a pair of fingers (13.1) extending like the tines of a fork and guided movably relative to corresponding guides (11.3) with which the shell (11) is provided, in that the said pawl consists of a transverse metal locking pin (14) which is fixed in the region of the free ends of the said fingers (13.1) so as to slide, together with the said button (13), within the said plane approximately perpendicular to the direction of insertion of the superimposed tongues (12), and in that the said elastic means (15), which consist for example of a leaf spring, are fitted between the said release button (13) and the shell (11) in such a way, that the tongues (12) are inserted on top of each other into the shell (11), their sliding face (12.1) passes over the transverse locking pin (14) and the wedge action of the said tongues on the pin (14) as the projection (12.3) is guided through the said insertion opening (11.1) pulls the button (13) down into the said working position, in opposition to the force of the elastic means (15), until the said pin (14) is level with the transverse cut (12.2), with which the pin then engages with a snap action, in the manner of a pawl, because of the return action of the said elastic means (15) on the button (13), which locking pin (14) thus holds the superimposed tongues (12) securely so that they cannot come out of the shell (11) and the release button (13) is automatically returned to and held in its rest position, with the

result that the seat belt is securely fastened, while in order to unfasten the belt it is sufficient to apply manual pressure on the release button (13) to overcome the force of the elastic means (15) and sink the button into its depressed working position, in order for the transverse locking pin (14) to disengage from the transverse cut (12.2) of the superimposed tongues (12), which are automatically ejected from the shell (11) by the opposing elastic force of the elastic ejection member (16), which was preloaded during the insertion of the said tongues.

3. Buckle for seat belt according to Claim 2, characterized in that, in the shell (11), each said guide (11.3) contains a through slot (11.5), the major axes of which are aligned with each other in the said plane which is approximately perpendicular to the direction of insertion of the tongues (12), and in that the ends of the said locking pin (14) extend into the said slots (11.5), in such a way that the movements of the release button (13) relative to the shell (11) are limited by the travel of the said ends of the pin (14) in the slots (11.5).



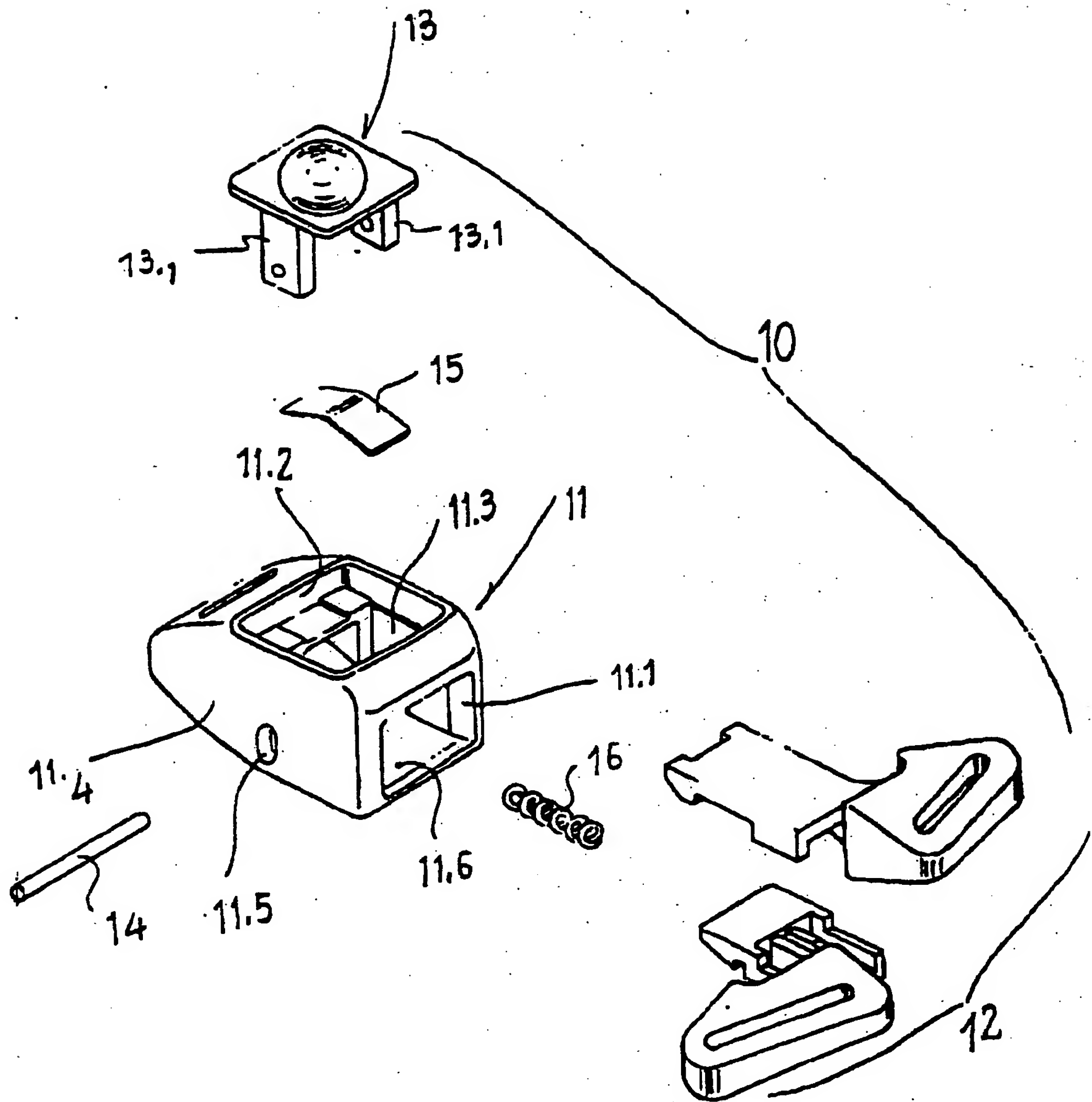
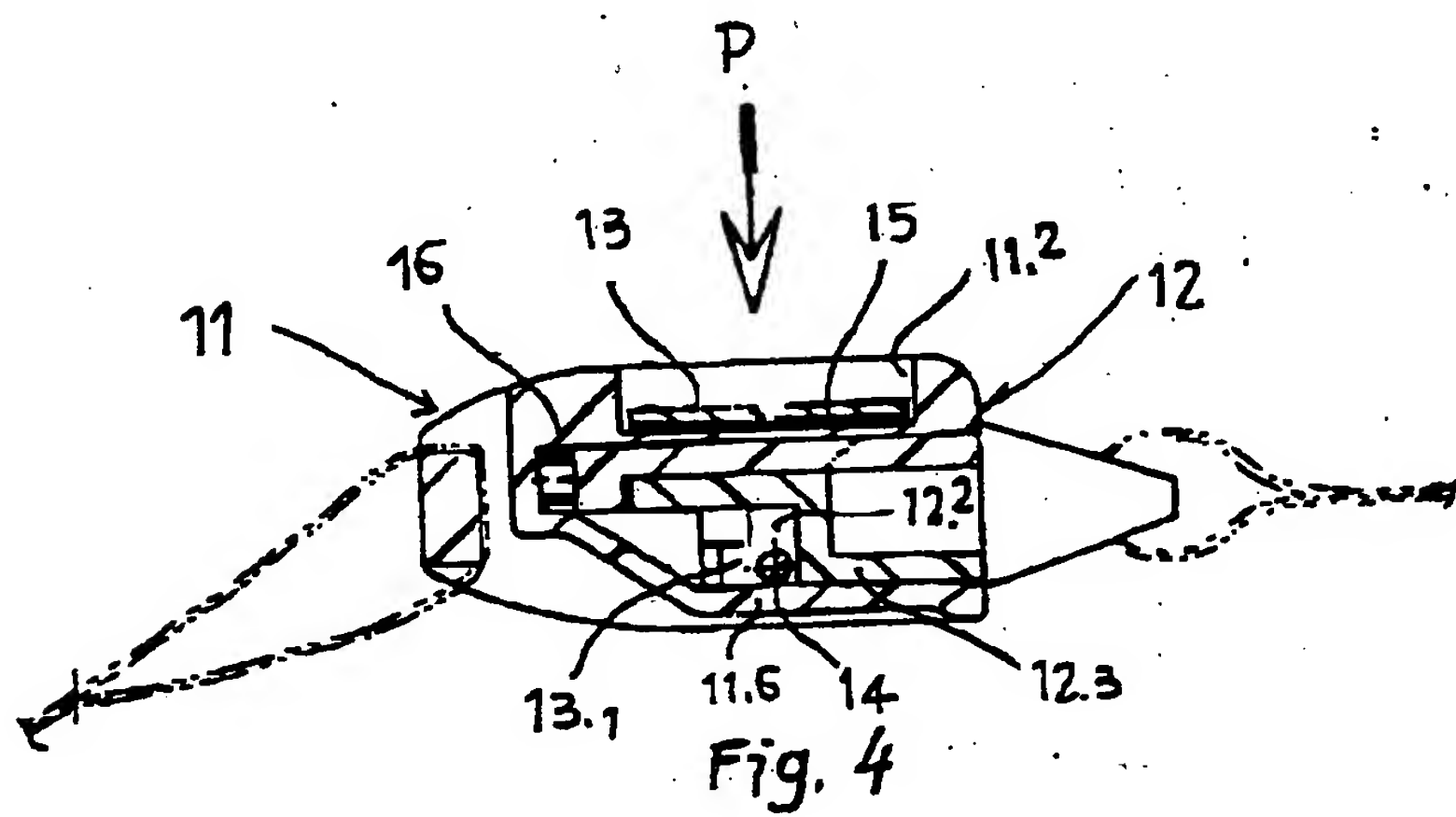
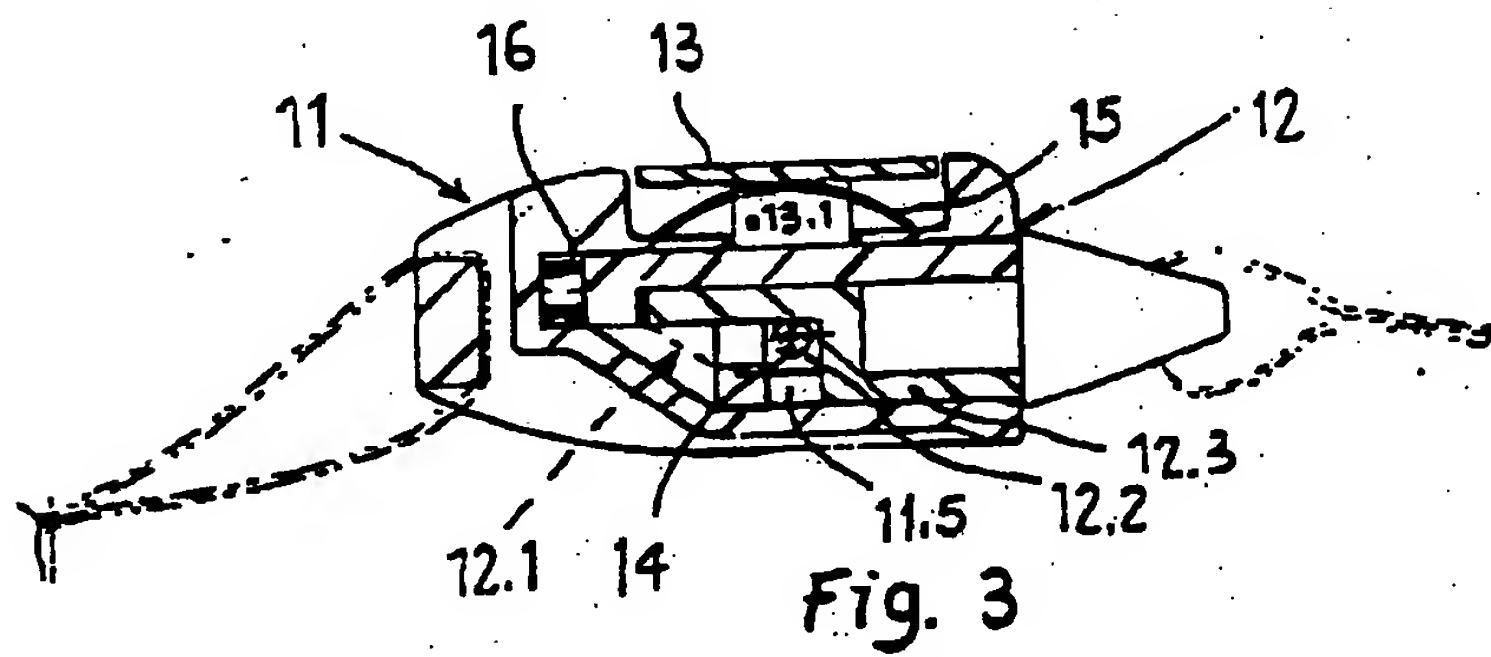
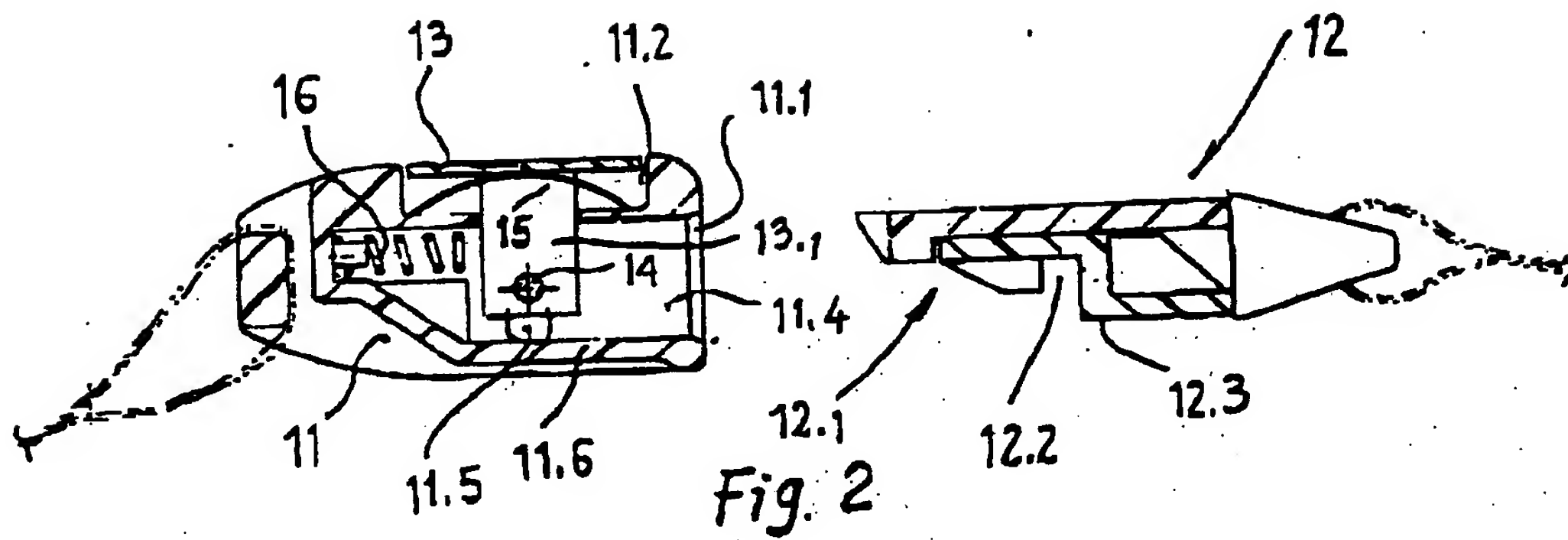


Fig. 1





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# EUROPEAN SEARCH REPORT

Application Number  
EP 98 10 3267

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
A	EP 0 309 943 A (YOSHIDA KOGYO) 5 April 1989 * the whole document *	1,2	A44B1/00 A44B11/25
A	US 2 882 581 A (THE AEROTHERM CORPORATION) 21 April 1959 * the whole document *	1,2	
A	GB 218 779 A (NORA BOURKE)		
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			A44B
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 22 June 1998	Examiner Loncke, J
<p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons ..... &amp; : member of the same patent family, corresponding document</p>			

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